PHSB STUDIES

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MORTALITY IN NORTH CAROLINA CITIES

Increasingly during the 1970's, high-speed computers have given rise to large
volumes of population-based statistical data for counties. Not so for cities, how-
ever, due to the fact that annexation generally precludes reliable intercensal popu-
lation bases in the required detail. Thus, this paper uses deaths during 1968
through 1972 and the midyear population (1970 Census) to examine age-race-sex-adjusted
mortality in 38 North Carolina cities. These cities were each incorporated and had
population exceeding 10,000 in 1970.

The table on page 2 ranks the cities with respect to total and selected cause-
specific mortality rates (adjusted). Examination of these data reveals that Hickory
and Sanford, followed by Goldsboro, Jacksonville, Eden, Fayetteville, Lumberton and
Shelby, were relatively unhealthy places to live during the period of study. These
eight cities each experienced age-race-sex-adjusted mortality in excess of 11.0
deaths per 1,000 population while the state experienced a rate of 8.9. At the same
time, the cities of Morganton and Chapel Hill appear relatively healthy places to
have lived, each experiencing a rate below 7.0 for the 5-year period.

Investigators of local health conditions should use the data of this report to
ascertain cause-specific problem areas and to postulate and investigate possible
reasons. One must wonder, for example, what—if not age, race and sex distributions
—are the factors contributing to wide disparity in the city death rates. Why should
such demographically similar places as Shelby and Morganton be experiencing drastically
different heart disease rates? Located in adjacent western counties, each is a county
seat. Apparent levels of health care resources appear about the same for each city,
but Morganton residents—being associated with nearby Broughton Hospital—more often
work in the health field. Other differences include elevation—Shelby at 853 feet
and Morganton at 1,182—and Shelby supports more textile manufacturing and more
agriculture-related activity. Although income levels are slightly lower in Shelby
than in Morganton, education levels are about the same.

To what extent are the above differences contributing—directly or indirectly—to
a wide difference in the two cities' heart disease experience? Is differential
diagnosis and reporting a significant factor? Are all known differences taken together
sufficient to explain Shelby's more than four-fold heart disease mortality over that
of Morganton? What factors cause Morganton's heart disease mortality to be only
one-third the statewide level? Or are the responsible factors yet unknown or
unmeasured?

Again, consider the twin cities of Lexington and Salisbury. Located in adjacent
counties and only 17 miles apart, Lexington's heart disease rate (441.6) is at the
upper end of the range while Salisbury's (274.3) is at the lower end. Income levels
are about the same, bu Lexington residents are less well educated, more often work
in manufacturing (particularly furniture), and appear exposed to considerably less in
terms of health care resources.

Also located in adjacent counties, Charlotte and Gastonia are another example of
disparate heart disease mortality. Here, obvious differences between the cities
include considerably higher levels of income, education and health care resources in
the case of Charlotte with considerably more textile manufacturing occurring in
Gastonia.

38 NORTH CAROLINA CITIES RANKED ACCORDING TO AGE-RACE-SEX-ADJUSTED DEATH RATES DURING 1968-72

(Underlying Cause of Death)

Low rank equals low rate

Incorporated Cities of 10,000 or More Population in 1970	Heart Disease	Cancer	Stroke	Arteriosclerosis	Hypertension	Chronic Obstructive Lung Disease	Influenza/Pneumonia	Diabetes Mellitus	Cirrhosis of the Liver	Nephritis/Nephrosis	Motor Vehicle Accidents	All Other Accidents	Suicide	Homicide	Site-specific Cancer									TOTAL
															Stomach	Colon/Rectum	Pancreas	Trachea, Bronchus and Lung	Female Breast	Cervix Uteri	Ovary, Fallopian Tube & Broad Ligament	Prostate	Leukemia	
Albemarle	26	31	35	5	2	7	30	20	12	34	33	30	2	31	14	35	26	6	38	19	30	30	16	26
Asheboro	27	33	36	28	10	21	38	33	26	24	32	29	6	37	30	37	27	25	16	26	34	1	23	30
Asheville	11	32	15	26	25	30	26	18	28	21	2	35	30	19	35	22	16	31	20	29	22	18	19	19
Burlington	13	21	16	17	30	34	14	28	10	9	18	3	8	32	13	15	20	23	24	30	12	36	20	15
Chapel Hill	2	4	12	6	9	3	2	15	31	6	1	4	3	11	9	30	35	2	3	3	13	20	32	3
Charlotte	10	16	1	7	17	12	20	8	32	25	12	10	25	25	26	27	8	27	22	13	21	27	13	6
Concord	21	23	29	30	23	10	32	11	27	29	6	33	18	13	31	13	9	15	35	10	35	25	2	21
Durham	6	26	6	22	14	35	21	9	24	14	4	8	13	6	33	16	18	32	14	15	24	19	31	7
Eden	36	14	31	4	38	24	10	38	1	12	26	14	31	10	21	5	37	3	5	17	18	6	3	34
Elizabeth City	18	20	4	8	7	9	18	34	5	4	22	27	9	4	17	24	22	26	34	1	33	35	25	10
Fayetteville	23	27	21	33	35	32	28	21	33	18	35	28	12	24	24	7	17	28	9	22	25	12	30	33
Gastonia	32	6	27	35	26	25	37	24	17	15	27	22	11	21	16	8	10	14	15	31	14	14	10	28
Goldsboro	34	30	30	12	20	37	35	10	23	7	20	37	17	29	10	18	19	35	25	8	6	34	26	36
Greensboro	4	17	9	19	22	22	13	2	35	27	5	15	23	7	11	25	15	17	18	16	19	28	17	5
Greenville	28	29	25	1	13	20	4	6	6	13	36	9	5	2	22	32	36	29	17	20	4	22	35	13
Henderson	22	18	22	32	21	2	27	31	37	38	31	6	1	1	23	34	11	21	23	33	27	15	34	16
Hickory	33	38	38	13	18	23	36	17	30	28	21	16	16	22	38	19	33	24	29	37	37	26	14	38
High Point	8	15	11	31	11	4	12	36	4	23	8	38	22	20	19	10	28	33	11	18	15	16	15	8
Jacksonville	31	22	18	29	3	29	5	27	16	16	13	12	35	14	37	23	1	38	36	23	1	38	4	35
Kinston	30	37	32	9	27	28	25	32	14	31	9	26	7	23	27	3	29	7	33	28	3	3	29	27
Lenoir	25	8	13	21	37	26	33	1	22	17	34	24	19	9	36	26	4	16	28	12	2	10	37	18
Lexington	35	7	26	38	36	36	24	23	2	26	37	32	33	15	20	17	23	9	13	32	20	24	28	29
Lumberton	12	5	33	37	19	14	29	35	13	32	17	21	27	35	12	20	24	12	2	24	16	9	38	32
Monroe	7	2	20	3	16	15	16	25	34	8	25	5	34	34	2	14	3	1	4	21	17	23	11	14
Morganton	1	35	3	20	1	16	23	14	38	37	29	23	29	28	8	12	2	36	1	4	8	31	24	—
New Bern	16	11	28	15	12	27	11	5	11	20	3	8	36	26	32	36	32	20	26	36	10	17	5	24
Raleigh	5	25	2	11	6	13	31	22	29	5	28	31	26	8	15	9	14	37	32	5	36	33	12	3
Reidsville	17	28	24	36	32	11	9	16	8	33	23	36	38	16	5	31	6	4	10	2	31	2	7	20
Roanoke Rapids	9	24	37	14	4	6	3	7	7	10	10	11	28	3	34	6	25	34	37	9	32	29	18	25
Rocky Mount	14	3	34	25	8	38	6	30	15	35	15	17	14	12	29	38	12	5	21	7	28	5	22	12
Salisbury	3	36	23	34	34	17	22	37	18	22	38	34	4	17	6	6	13	19	19	11	38	32	4	4
Sanford	37	12	7	23	31	19	17	26	19	3	7	19	37	36	3	38	38	10	7	35	23	11	33	37
Shelby	38	10	5	2	24	18	19	29	9	11	14	13	21	38	18	29	7	13	6	38	28	7	27	31
Statesville	29	9	19	10	28	33	8	4	21	30	30	2	24	33	7	33	30	8	27	34	9	37	9	17
Thomasville	19	34	8	27	29	31	15	13	3	36	16	20	10	30	28	2	31	17	31	6	26	21	8	9
Wilmington	15	19	17	24	33	19	34	12	36	19	19	35	15	27	4	21	21	18	8	27	5	8	36	23
Wilson	24	13	14	2	29	18	7	19	20	30	11	7	32	5	7	11	34	10	30	14	29	13	6	22
Winston-Salem	20	13	10	18	15	31	7	19	25	19	11	7	20	18	25	28	5	22	12	25	29	13	21	11
Lowest Rate	109.2	93.8	85.1	3.7	0.6	4.4	18.3	6.2	9.3	1.5	15.1	17.7	2.3	5.0	1.1	8.1	2.5	10.7	5.3	0.0	0.6	3.0	1.6	6.6
Highest Rate	498.3	184.0	173.8	37.4	57.7	28.6	57.2	30.6	29.7	9.9	62.8	56.8	25.9	35.1	15.1	28.0	17.5	53.6	40.5	17.7	18.8	49.9	12.1	12.3
State Rate	318.8	127.8	109.4	12.5	5.1	14.0	31.7	17.2	11.7	5.1	36.3	31.4	11.2	12.8	5.6	13.7	7.0	24.4	21.3	7.7	6.6	16.3	6.3	8.9

Other cities should similarly compare themselves with their nearest neighbors in an attempt to identify factors that may be contributing to differentials in mortality. What factors, for example, might underlie excessive lung cancer in Rocky Mount compared with excessive chronic obstructive lung disease in Wilson? Or excessive pancreatic cancer in Wilson and Greenville as compared with Rocky Mount?

The data of the preceding table also allow for a comparison of disease entities. Particularly notable are high positive correlations* between heart disease and each of cervical cancer, hypertension and influenza/pneumonia (in decreasing order of significance) and between chronic obstructive lung disease and both arteriosclerosis and hypertension. Influenza/pneumonia also correlates highly with motor vehicle accidents and non-motor-vehicle accidents while cervical cancer correlates highly with both homicide and colon/rectum cancer. All preceding correlations are positive at p < .01.

Also of interest are findings for negative and significant correlations (p < .05) between cirrhosis of the liver and both heart disease and pancreatic cancer. Again, with the highest cirrhosis rate of the 38 cities but with low heart disease and pancreatic cancer mortality, Morganton epitomizes the presently observed statistical contrast among these diseases. Some other cities with high cirrhosis mortality, e.g., Charlotte, Greensboro and Monroe, also experienced relatively low heart disease and pancreatic cancer mortality during the period of study.

Perhaps this paper raises more questions than it answers, but at least—for the first time ever—North Carolina cities have the opportunity to examine their cause-specific mortality and to investigate possible contributing conditions beyond age, race and sex considerations. Cities desiring the actual death rates corresponding to the ranks used in this report may contact the Public Health Statistics Branch.

In the meantime, the Public Health Statistics Branch is in the process of restructuring computer tapes obtained from the National Center for Health Statistics in order to examine adjusted death rates based on multiple conditions present at death and recorded on the death certificates of city and county residents. Ensuing studies will include rank analyses, as presented in this paper, and regression analyses which purport to identify the particular social, economic and environmental factors with which conditions at death are associated (statistically). These analyses will be presented in future editions of PHSB Studies.

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*Spearman's coefficient of rank correlation.

An Historical Note

A breakthrough in North Carolina's health surveillance work occurred in 1913 when the General Assembly recognized Dr. W. S. Rankin's public health "need number one." Said Dr. Rankin, the state's first fulltime health officer:

> . . . The real ledger of a state board of health is kept not in
> dollars and cents but in death rates. . . .
> . . . When a surgeon rushes into a railroad wreck, he wisely
> attends first to those whose lives are in the greatest danger.
> A health department should do likewise—it should direct its
> life-saving efforts into those places where its work is most
> demanded—by what?—by high death rates. Where are such places
> in North Carolina? . . .

The state's vital statistics law, requiring statewide reporting of births and deaths, was implemented during 1913-14.

Public Health Statistics Branch
Division of Health Services
Department of Human Resources
P. O. Box 2091
Raleigh, North Carolina   27602